

City of Belleville

Report No: DTOS-2025-08

Meeting Date: June 23, 2025



To: Mayor and Members of Council

Department: Transportation & Operations Services

Staff Contact: Joseph Reid, Director, Transportation and Operations

Subject: Single-Family Residential Waste Composition Audit

Recommendation:

That the Director of Transportation and Operations Services Report DTOS-2025-08 Waste Audit Report be received as information.

Strategic Plan Alignment:

Environment: Provide and support effective solid waste management practises that include enhanced waste diversion initiatives

Background:

In the Fall 2023, the City of Belleville contracted AET Group Inc to conduct a residential curbside waste composition audit. The audit consisted of a two-week sampling period of 100 single family households each season and included the collection and sorting of garbage, recycling, and organics. The primary objective of this Waste Audit was to assess the performance of the City's recycling and organic waste programs, thereby ensuring the availability of robust data to align the City with forthcoming legislative changes and future environmental targets.

Financial/Analysis:

The Waste Audit Report has equipped staff with a comprehensive understanding of our curbside waste streams and has offered actionable insights to enhance the data obtained.

The waste audit report highlighted a 24% participation rate for the green bin program (organics), compared to a 71% participation rate for recycling. The participation rate is determined by the percentage of total households sampled that presented a bag, box, cart, or container for curbside collection on their designated collection day. The final Waste Audit report indicates that Belleville residents are actively participating in and effectively utilizing the

recycling program. Overall, the Waste Audit report found that 48% of the materials disposed of in the garbage stream were divertible and could have been placed in the recycling or organic bins. Presently, the City of Belleville diverts 34% of food and organic waste from landfills, which falls short of the 50% reduction and resource recovery benchmark set by the provincial government's Food and Organic Waste Policy Statement. This policy is in line with the directives outlined in section 11 of the Resource Recovery and Circular Economy Act, 2016.

The audit report noted that the City should prioritize evaluating its internal operations to ensure it has the necessary resources, including sufficient staffing, education programming to effectively manage waste. This evaluation should assess current staffing levels, identify potential gaps, and ensure that the right expertise and capacity are in place. Additionally, the City should ensure that resources are allocated appropriately to maintain waste management operations in compliance with regulatory requirements and to meet its established targets. Adequate staffing is crucial not only for day-to-day operations, but also for addressing future challenges and ensuring the City's waste management needs are met sustainably. Staff will prepare some considerations for the City's 2026 Operating Budget. Without doing a full review as recommended in the audit report, staff is estimating that the recommended resources likely will require the hiring of a staff member to oversee these type of initiatives, at an estimated annualized cost of \$80,000, and approx. \$20,000 in marketing, and mail-out costs. After staff evaluates internal operations and opportunities, there are likely some other initiatives that align with waste and other environmental related projects that could be achieved with a new position.

By increasing our diversion rate, we can effectively reduce landfill-related greenhouse gas emissions and potentially unlock cost-saving opportunities for residents long term. The report includes strategic recommendations for the City to consider, aimed at elevating diversion rates and achieving established targets.

Conclusion:

It is recommended that this report and Single-Family Residential Waste Composition Audit be received as information.

Attachments:

[Waste Audit Final Report \(1\)](#)

Reviewed by:

Perry DeCola, Director, Environmental Services
Brandon Ferguson, Director of Finance/Treasurer
Doug Irwin, City Clerk
Matt MacDonald, Chief Administrative Officer

Status:

Approved - 18 Jun 2025
Approved - 18 Jun 2025
Approved - 18 Jun 2025
Approved - 19 Jun 2025



City of Belleville
Single-Family Residential
Waste Composition Audit

4 Season Summary Report

Prepared for
City of Belleville

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April 2nd, 2025



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APPENDICES

APPENDIX A: Waste Audit Sort Results

EXECUTIVE SUMMARY

The City of Belleville contracted AET Group Inc. (AET) to conduct a residential curbside waste composition audit, which included a two-week sampling period of 100 single family households each season. The study included collecting and sorting garbage, recycling (2 stream, fibres and containers), and organics from ten single family sample areas, each comprising of ten households. Curbside set-out and participation data was also collected. Summaries of the key results are as follows:

- **Single-Family Curbside Surveying Results:**
 - Garbage – an average of 0.62 items were set out per household per week, with a participation rate of 47.20% for the garbage stream.
 - Fibres – an average of 0.72 items were set out per household per week, with a participation rate of 56.06% for the fibres stream.
 - Containers – an average of 0.70 items were set out per household per week with a participation rate of 58.00% for the containers stream.
 - Green Bin (Organics) - an average of 0.24 green bins were set out per household per week, with a participation rate of 23.93%.
- **Single-Family Garbage Stream Composition:**
 - Total garbage material generated by a single-family household is 291.18 kg/hh/yr (5.60 kg/hh/wk).
 - Accepted green bin material was the largest disposed divertible component in the garbage stream at 35.64%, or 103.77 kg/hh/yr (2.00 kg/hh/wk). Compostable Paper was 0.44 kg/hh/wk or 7.82% of this material.
 - Of the accepted green bin material in the garbage stream, approximately 46.65% consisted of wasted food and 31.40% consisted of unavoidable food waste.
 - Recyclable containers comprised 4.09% of the garbage stream, at 12.00 kg/hh/yr (0.23 kg/hh/wk)
 - Recyclable Fibres (including recyclable film) comprised 8.07% of the garbage stream, at 23.63 kg/hh/yr (0.45 kg/hh/wk).
- **Single-Family Fibres Composition:**
 - Total average grey bin material generated by single-family household is 88.37 kg/hh/yr (1.70 kg/hh/wk).
 - Among the highest capture rates for fibres were glass bottles and jars (90.66%), corrugated cardboard and boxboard (86.93%), and mixed paper (81.16%)
 - The lowest capture rate was for Flexible Film Plastics (36.33%).
 - The fibres stream had a contamination rate of 8.03%.
- **Single-Family Containers Composition:**
 - The containers generated by a single-family household is 59.17kg/hh/yr (1.14 kg/hh/wk).
 - The highest capture rates were observed for #1 PET Bottles, Containers and Jars – non alcoholic (81.96%), Aluminum UBC – Alcoholic (81.49%), and Steel cans (78.65%).
 - The lowest capture rates for containers was observed to be #1 PET Bottles – alcoholic (39.21%)
 - The blue bin stream had a contamination rate of 12.63%.
- **Single-Family Green Bin (Organics) Composition:**
 - Total average green bin material generated by a single-family household is 60.08 kg/hh/yr (1.16 kg/hh/wk).
 - The highest capture rates include certified compostable liners (96.50%)
 - Of all food waste, unavoidable food waste had the highest capture rate (47.11%), and untouched dry food waste had the lowest (12.63%).

- The City of Belleville currently diverts 33.88% of food and organic waste from landfill, which is below the 50% waste reduction and resource recovery of food and organic waste generated by single-family homes.
- Of the accepted material found in the green bin, approximately 33.73% consisted of wasted food waste, and 48.91% of unavoidable food waste.
- The single-family curbside green bin organic stream had a contamination rate of 6.53%.

1.0 INTRODUCTION

1.1 Definitions

Capture Rate: The capture rate is the percentage of recyclable / compostable material collected in the proper stream of the total amount of that material generated. It is an excellent indicator of how well a recycling/organics program is working for a particular material.

Contamination Rate: The percentage of material in a recycling or organics program that is not accepted in the program. An example would be the amount of non-recyclable material found within the recycling stream.

Cross Contamination: Instances of divertible recyclable material being placed into the incorrect stream within the curbside recycling programs. An example would be recyclable paper incorrectly placed into the containers stream.

Diversion Rate: The diversion rate is the percentage of the total waste generated that is diverted from disposal into the curbside organics and recycling programs.

Divertible Material: Materials that are accepted in a recycling/organics program which can be discarded in a non-garbage collection stream. Material that does not require disposal through landfill. This material is often referred to as recyclable material or compostable material.

Garbage Stream: Material that is collected for disposal rather than diversion. It will include divertible material (recyclable/compostable materials) where the diversion programs are not operating at 100% capture. This material is sometimes referred to as residual waste.

Full Container

Equivalents: Ratio or value given to the number of materials in a cart/bin/container/bag, to determine fullness. Value increases in increments of 25%, to a maximum fullness of 100% (full cart/bin/container/bag). It is based on the size of the individual cart/bin/container/bag.

Participation Rate: The percentage of the total households sampled placed a bag, box, cart, or container of material out for curbside collection on their regularly scheduled collection day. The term can apply to garbage, recycling and green bin material. For this study, participation was calculated as the proportion of households that had something set out on a week-by-week basis (e.g. if a household set out a green bin in week 1 of the study, but not week 2 of the study, the participation was calculated as 1 out of 2 or 50%).

Organics: Refers to those materials that can be composted. The materials accepted in any given organics program is dependent on the type of composting facility accepting the material, how it is processed and what quality of processed material is desired.

Recycling Stream: Material that is diverted from the garbage stream in a recycling program such as Blue Box or Grey Box recycling.

1.2 Background

AET Group Inc. conducted a single-family curbside residential waste audit for the City of Belleville for 4 seasons starting in Fall 2023 and ending in Summer 2024. For the waste composition audits, the garbage, recycling, and organics streams were audited for 100 single family households. This study assessed the quantity of waste generated and the composition of waste streams over the two-week study period. Curbside waste including garbage, recycling (2 stream, fibres and containers), and organics was collected from each household on their designated set-out day, sorted, and weighed by street.

1.3 Objectives

The objectives of the waste audit study are to:

- Collect accurate single family household waste composition data through the identification of types and quantities of generated waste;
- Calculate various performance indicators such as generation, capture, contamination, and participation rates;

1.4 Audit Scope

The scope of this study involved a physical audit of curbside waste generated from 100 single-family households over a two-week sample collection period for each season. All curbside garbage, recycling and organics stream material generated by the sample households were collected and subject to waste composition analysis by AET. Full curbside collection surveying was also carried out to determine the types and amounts of materials set out for collection at the curb, as well as participation.

2.0 APPROACH AND METHODOLOGY

2.1 Waste Sampling Process

AET's audit team collected garbage, recycling (2 stream, fibres and containers) and organic material from 100 single family residential households over a two-week sampling period in each season. All garbage, recycling and organic materials were collected at each of the selected households. Collected material was brought back to a centralized location where each stream and sample area was sorted separately.

2.2 Collection Logs

Collection logs were maintained during the single family residential curbside collection of each of the 100 households. Specific data including the number and size of garbage, recycling and green cart/bin/container/bag items set out as well as the fullness value of each item was recorded at the curbside.

An analysis of the collection log data provided total number of items set out, total full container equivalents, total number of households with a set-out and total full container equivalents per household for the study period.

2.3 Material Sorting Process

All waste material collected during the sampling period was sorted and weighed by AET at 29 Ritz Rd, Corbyville, ON. All collected garbage, recycling and organics were sorted and weighed separately by sample area and by stream.

Samples were sorted into 7 major waste groups, consisting of 57 individual categories.

Separated/sorted waste was placed in blue boxes and totes, based on the 57 categories, and weighed individually. A digital scale, with precision to 0.01 kg, was used to weigh the sorted waste material. Once all the waste material was classified and weighed, non-divertible material (garbage), recycling materials (fibres and containers) and organics were placed in separate roll-off bins for the City.

2.4 Assumptions and Calculations

This audit assumes that the selected households and buildings are representative of the composition of waste generated by all households in Belleville.

Calculations:

Weekly Waste Generation (kg/hh/wk):

$$\frac{\text{weight of 14 day sample}}{\text{number of households sampled in period}} \div 2 \text{ weeks}$$

Annual generation rate:

$$\text{Weekly Generation Rate} \times 52 \text{ weeks}$$

Diversion Rate:

$$\frac{\text{weight of material diverted}}{\text{total weight of all material generated}} \times 100\%$$

Capture Rate:

$$\frac{\text{weight of a particular material diverted}}{\text{total weight of that particular material generated}} \times 100\%$$

3.0 RESULTS

Results shown in this section are summarized into primary and secondary categories. Detailed audit sort results by material sub-category are available in Appendix A. Please note that for the purposes of this study, materials have been classified as 'Containers, 'Fibres, 'Green Bin', or 'Garbage' based on their acceptance into the curbside diversion programs.

For illustrative purposes, some of the results have been extrapolated to estimated generation rates of kilograms per household per week (kg/hh/wk) and kilograms per household per year (kg/hh/yr).

3.1 Single Family Residential Curbside Collection Results

A summary of the collection results for the sampled households is provided in Table 3.1. Overall, during the two consecutive sampling weeks, waste generation data for garbage, recycling and organics was collected for all sample addresses with set-out.

The average number of garbage and green bin items set out per household per week for Belleville is 0.65 and 0.23, respectively. The average number of fibres bins and containers bin recycling set out per household per week is 0.65 and 0.71, respectively. The average full container equivalent per set-out (i.e. when a household sets something out, what is the full container equivalent) is 1.11 for fibres bin, 1.03 for containers bin, 1.31 for garbage, and 0.33 for green bin.

The participation rates for the four waste streams are: Garbage at 47.20%, Fibres at 56.06%, Containers at 58.25%, and green bin at 23.93%.

Table 3.1 City of Belleville Single Family Residential Curbside Collection and Participation Results

4 Seasons	Garbage	Fibres	Containers	Organics
Total number of households sampled	197.50	196.25	196.25	197.50
Total number of household set-outs	93.25	110.00	114.25	47.25
Total number of items	122.50	142.06	137.50	47.25
Total number of full container equivalents	120.56	129.00	114.63	16.75
Average number of items/hh/wk	0.62	0.72	0.70	0.24
Average number of full container equivalents/hh/wk	0.61	0.66	0.58	0.08
Average number of full container equivalents/set out	1.30	1.17	1.00	0.35
Participation Rate	47.20%	56.06%	58.25%	23.93%

3.2 Overall Curbside Waste Set-Out Profile

Table 3.2 illustrates the actual generation rates for all four waste streams. This information accounts for the weights of materials set-out in that particular stream, and does not show any contamination (i.e. recyclables in the garbage, non-divertible items in the recycling, etc.) placed in each stream. By weight, the garbage stream represented the largest proportion of generated material at 58.38%, followed by fibres bin at 17.72%. The containers bin material made up 11.86%, and the green bin generated the least at 12.04%.

Table 3.2 Curbside Waste Set-Out Rate 2023/2024

Waste Stream	Total	Percentage Breakdown
	kg/hh/wk	%
Garbage	5.60	58.38%
Fibres	1.70	17.72%
Containers	1.14	11.86%
Organics	1.16	12.04%
Total	9.59	100.00%

3.3 Single Family Overall Waste Composition Profile

The annual waste composition profiles for the sampled Belleville single-family households are shown in Table 3.3. The average overall weekly waste generated is 9.59 kg per household per week (kg/hh/wk), or 498.74 kg per household per year (kg/hh/yr). These overall waste generation profiles include the sampled garbage, recycling, and organics combined across all 4 seasons. Displayed in each table is the overall amount of recycled and composted materials (diverted from landfill), disposed recyclable materials, disposed compostable materials, and disposed non-divertible materials generated.

Table 3.3 Belleville Single Family Overall Waste Generation Profile (kg/hh/wk)

Material	Recycled	Disposed Recyclables	Diverted Organics	Disposed Organics	Disposed Non Divertible	Total	Percentage Breakdown
	kg/hh/wk	kg/hh/wk	kg/hh/wk	kg/hh/wk	kg/hh/wk	kg/hh/wk	%
PAPER AND PAPER PACKAGING	1.55	0.30	0.10	0.44	0.07	2.46	25.68%
PLASTICS	0.53	0.26	0.00	0.00	0.47	1.26	13.16%
METALS	0.16	0.08	0.00	0.00	0.03	0.27	2.82%
GLASS	0.31	0.04	0.00	0.00	0.05	0.40	4.23%
ORGANICS	0.00	0.00	0.98	1.56	1.86	4.40	45.70%
HHW	0.00	0.00	0.00	0.00	0.04	0.04	0.39%
E-WASTE	0.00	0.00	0.00	0.00	0.06	0.06	0.63%
OTHER WASTE	0.00	0.00	0.00	0.00	0.70	0.70	7.39%
Total	2.56	0.68	1.08	2.00	3.28	9.59	100.00%

On average, Belleville single family households set out a total of 9.59 kg/hh/wk of waste at the curb. Of this, approximately 3.64 kg/hh/wk or 37.92% is diverted through curbside waste diversion programs (recycling and green bin). However, 0.68 kg/hh/wk of recyclable material and 2.00 kg/hh/wk of compostable material are still being disposed of. The remaining 3.28 kg/hh/wk (34.17%) of generated waste material is non-divertible material (in existing curbside programs). It should be noted that this diversion rate does not include leaf and yard waste set out at the curb, nor does it include those special materials that may have been diverted through special drop off locations (HHW, WEEE, Reusables etc.).

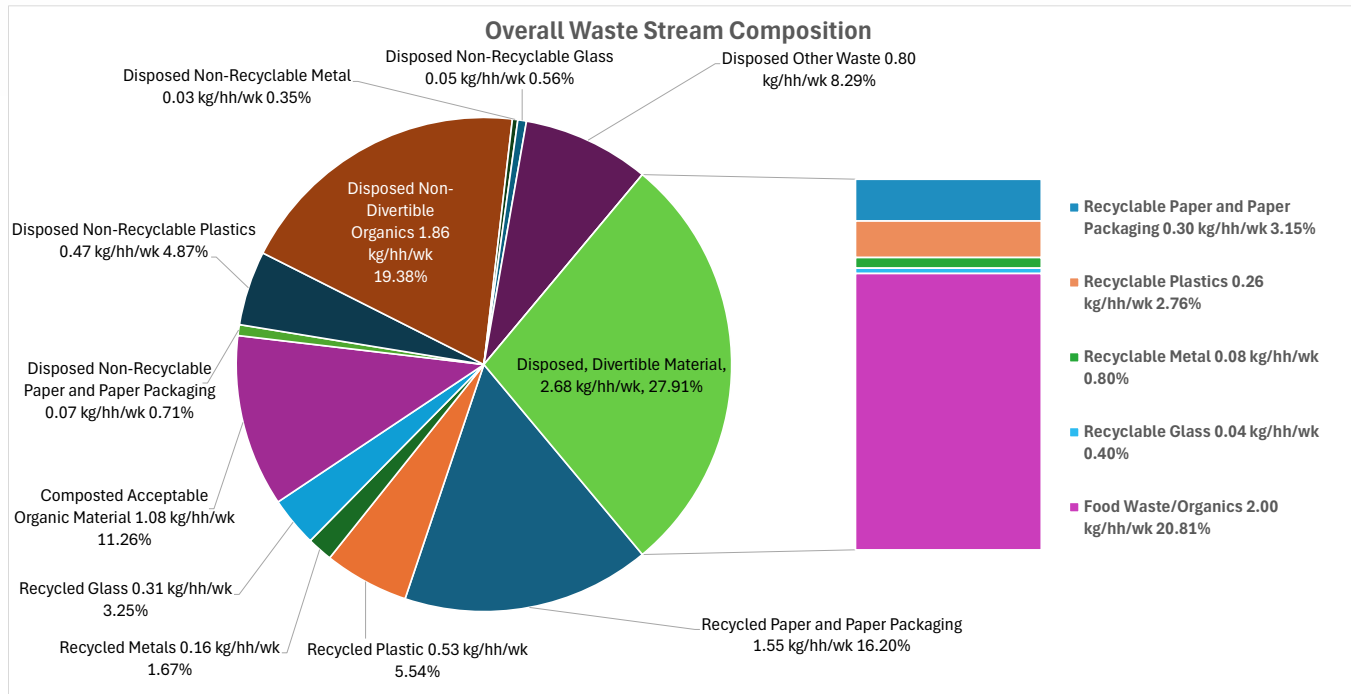


Figure 3.1 Single Family Overall Waste Generation Profile (kg/hh/wk)

As can be seen in Figure 3.1, approximately 27.91% (2.68 kg/hh/wk) of the total overall waste generated is divertible material that was disposed of. It should be noted that Composted Acceptable Organic Material includes food waste and soiled paper and paper packaging diverted through the green bin organics stream. Table 3.4 below summarizes the 2023/2024 waste profile in kg/hh/yr, which is extrapolated from the kg/hh/wk values presented in Table 3.3. This assumes the waste profile would be consistent throughout the year.

Table 3.4 Single Family Overall Waste Generation Profile (kg/hh/yr)

Material	Recycled	Disposed Recyclables	Diverted Organics	Disposed Organics	Disposed Non-Divertible	Total	Percentage Breakdown
	kg/hh/yr	kg/hh/yr	kg/hh/yr	kg/hh/yr	kg/hh/yr		%
PAPER AND PAPER PACKAGING	80.81	15.69	5.18	22.76	3.55	127.99	25.66%
PLASTICS	27.65	13.74			24.28	65.67	13.17%
METALS	8.32	3.98			1.75	14.05	2.82%
GLASS	16.20	2.01			2.81	21.01	4.21%
ORGANICS			50.97	81.01	96.67	228.66	45.85%
HHW					1.94	1.94	0.39%
E-WASTE					3.15	3.15	0.63%
OTHER WASTE					36.27	36.27	7.27%
Total	132.97	35.41	56.16	103.77	170.43	498.74	100.00%

3.4 Single Family Garbage Stream Results

The garbage generated by the sampled households equated to 5.60 kg/hh/wk or 291.18 kg per household per year. Of this, the amount of recyclable materials found in the garbage stream represents 0.68 kg/hh/wk or 35.41 kg/hh/yr (12.16%). The amount of accepted organics in the garbage stream represents 2.00 kg/hh/wk or 103.77 kg/hh/yr (35.64%). The remainder is 2.92 kg/hh/wk or 152.00 kg/hh/yr (52.20%) of other materials. See Figure 3.2 below for a more detailed breakdown.

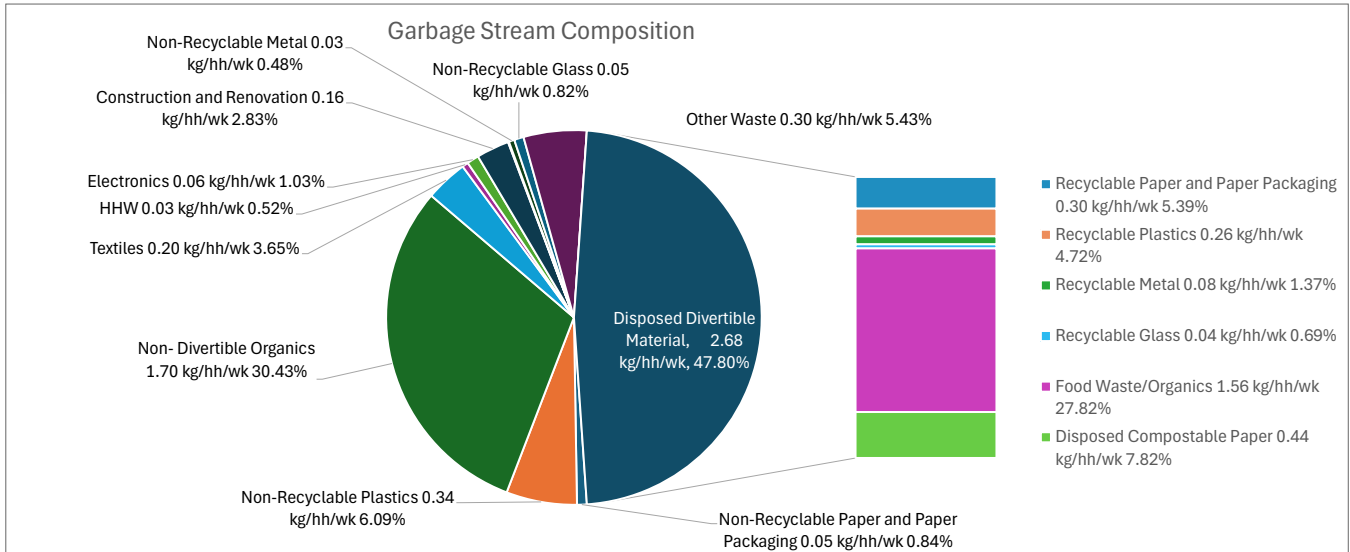


Figure 3.2 Belleville Single Family Garbage Composition

Please note that while Compostable Paper falls under disposed organics, it is displayed separately in the figure above to demonstrate the proportion disposed. A significant amount of compostable paper was disposed with 7.82%, and it is important to highlight this in conjunction with disposed food waste and organic material with 27.82%.

The figures below show instances of divertible material in the garbage stream over the 4 seasons.



Figure 3.3 Aluminum Cans in the Garbage



Figure 3.4 Mixed Paper in the Garbage



Figure 3.5 Food Waste in the Garbage



Figure 3.6 Paper Towels in the Garbage



Figure 3.7 Recyclable Plastics in the Garbage



Figure 3.8 Boxboard in the Garbage

3.5 Single Family Recycling Stream Results

Fibres Recycling Stream

The fibres bin stream generated by the sampled households equated to 1.70 kg/hh/wk or 88.37 kg/hh/yr. Of this, accepted stream materials represented 1.52 kg/hh/wk or 79.25 kg/hh/yr (89.68%). Cross contamination accounted for 0.04 kg/hh/wk or 2.02 kg/hh/yr (2.29%). Contamination accounted for 0.14 kg/hh/wk or 7.10 kg/hh/yr (8.01%), which consisted mostly of organics, followed by non-recyclable plastics. See Figure 3.9 for a more detailed breakdown.

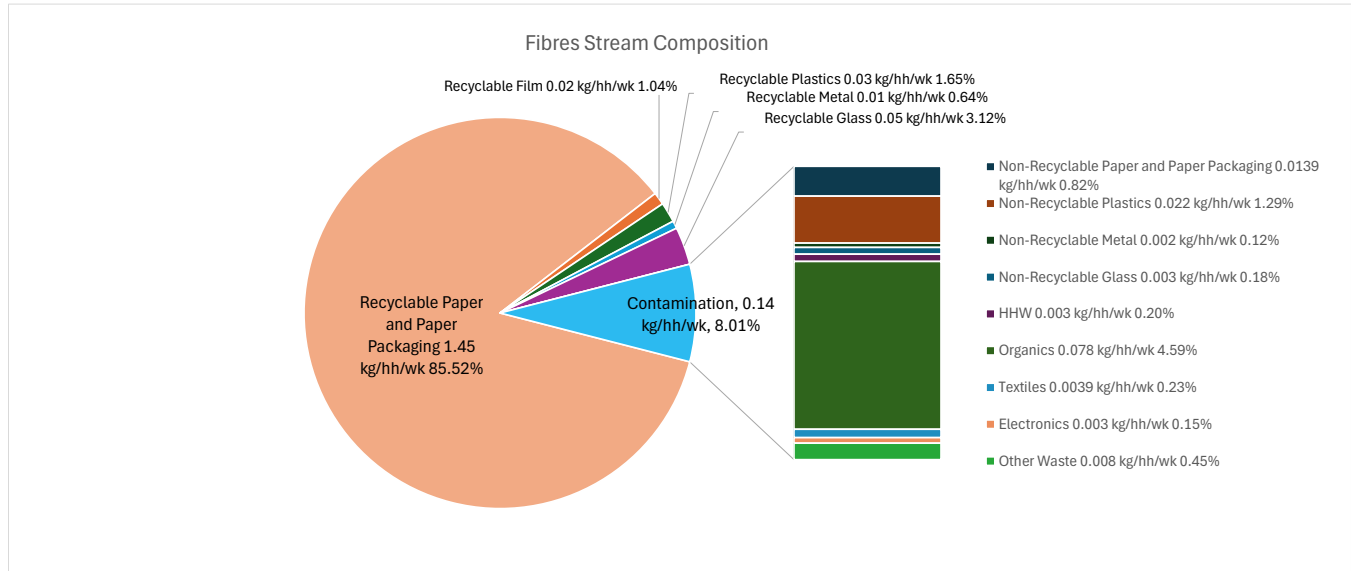


Figure 3.9 Belleville Single Family Fibres Bin Recycling Composition

The figures below show instances of contamination in the fibres stream over the 4 seasons.



Figure 3.10 Cross Contamination - Aluminum



Figure 3.11 Cross Contamination - Mixed Plastics



Figure 3.12 Contamination - Paper Towels

Containers Recycling Stream

The containers bin stream generated by the sampled households equated to 1.14 kg/hh/wk or 59.17 kg per household per year. Of this, accepted stream materials represented 0.59 kg/hh/wk or 30.47 kg/hh/yr (51.50%). Cross Contamination accounted for 0.41 kg/hh/wk or 21.23 kg/hh/yr (35.87%). Contamination accounted for 0.14 kg/hh/wk or 7.47 kg/hh/yr (12.63%), in which Non-recyclable plastics was a significant portion as seen below in Figure 3.13.

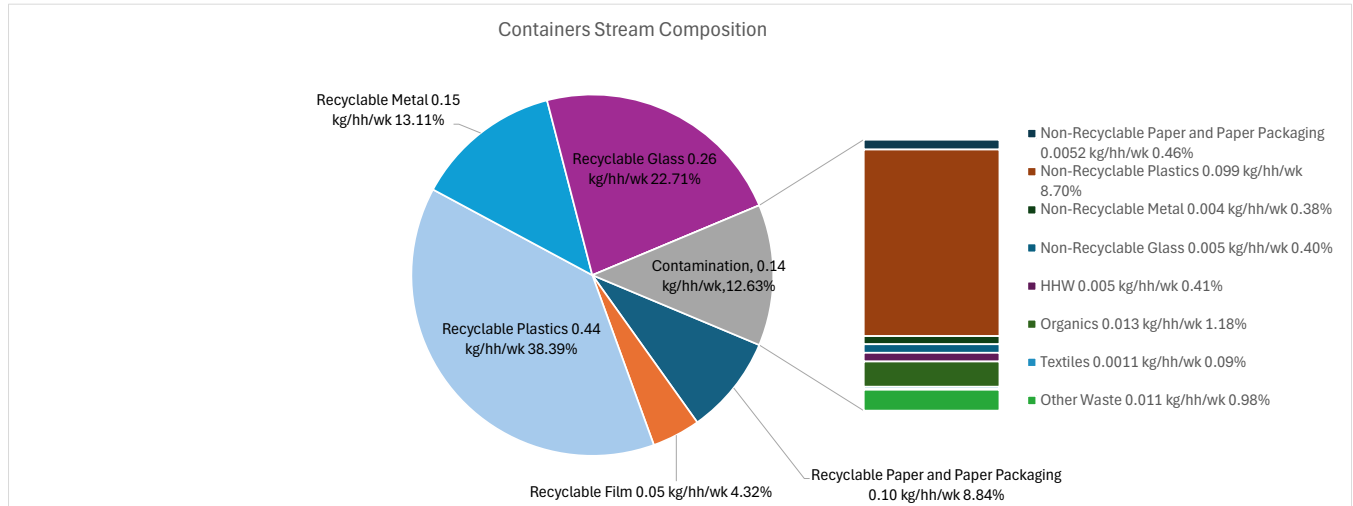


Figure 3.13 Belleville Single Family Blue Bin Recycling Composition

Recyclable glass was the largest incident of cross contamination in the containers stream with 0.26 kg/hh/wk (22.71%). The figures below show instances of contamination in the containers stream over the 4 seasons.



Figure 3.14 Contamination - Recyclable Glass



Figure 3.15 Contamination - Plastic Laminates



Figure 3.16 Contamination - Mixed Paper



Figure 3.17 Contamination - Other Rigid Plastics

3.6 Single Family Green Bin Stream Results

The green bin organics stream is generated at a rate of 1.16 kg/hh/wk or 60.08 kg per household per year. Of this total material, the acceptable materials represent 1.08 kg/hh/wk or 56.16 kg/hh/yr (93.47% of the green bin composition). Contamination accounts for approximately 0.08 kg/hh/wk or 3.92 kg/hh/yr (6.53%). Recyclable printed paper and paper packaging were not classified as contaminants in the green bin, and were classified as Compostable Paper and Paper Packaging. Within the green bin organics stream, wasted food waste represents approximately 0.39 kg/hh/wk or 20.29 kg/hh/yr (33.73%), unavoidable food waste represents 0.57 kg/hh/wk or 29.43 kg/hh/yr (48.91%).

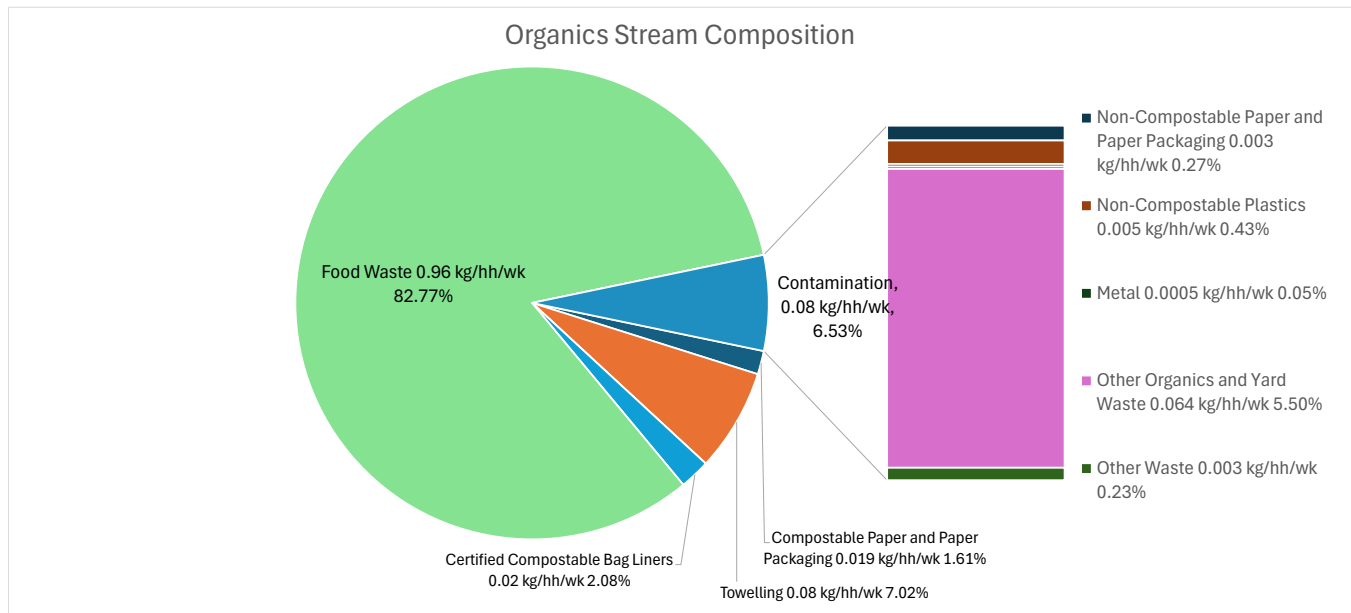


Figure 3.18 Belleville Single Family Green Bin Composition

The figures below show instances of contamination in the green bin organics over the 4 seasons.



Figure 3.19 Contamination - Plastic Laminates



Figure 3.20 Contamination - Yard Waste



Figure 3.21 Contamination - Non-Compostable Paper Packaging

3.7 Capture Rates for Curbside Recycling and Organics Streams

The capture rates for recyclable and organic materials within the City of Belleville’s curbside program are discussed within this section. This information has been calculated and displayed in terms of kilograms per household per year. The capture rates have been determined by calculating the amount of each divertible material captured within the recycling and organic streams compared to the overall amount of that specific material generated (disposed within the garbage, placed within the recycling, and placed within the organics streams together).

Table 3.5 outlines the capture rates for the curbside recycling material. The calculated overall capture rate for fibres is 80.81%, which includes all materials accepted in the fibres stream in Belleville. The capture rate for containers stream was measured at 73.17%. Among the highest capture rates for fibres were corrugated cardboard and boxboard (86.93%) and Glass bottles and jars (85.96%). For the containers bin stream The highest capture rates were observed for Aluminum UBC - Alcoholic (81.49%), Steel Cans (78.65%), and #1 PET Bottles, Containers and Jars – non alcoholic (81.96%) The lowest capture rate for the fibres bin was HDPE & LDPE Flexible Film Plastics (36.33%). The lowest capture rates for containers were observed to be #1 PET Bottles – alcohol (39.21%)

Table 3.5 Single Family Recycling Capture Rates

Material Category	Accepted Stream	Diverted kg/hh/yr	Disposed kg/hh/yr	Capture Rate (%)
Mixed Paper	Fibres	20.25	4.70	81.16%
Books	Fibres	0.61	1.49	29.11%
Shredded Paper - bagged	Fibres	0.13	0.00	100.00%
Corrugated Cardboard (OCC) + Boxboard	Fibres	56.47	8.49	86.93%
Gable Top Carton/Aseptic – non-alcoholic	Fibres	3.20	1.00	76.16%
Gable Top Containers/Aseptic – alcoholicbeverage	Fibres	0.00	0.03	0.00%
HDPE & LDPE- Flexible Film Plastics,	Fibres	3.47	6.09	36.33%
Glass Bottles and Jars	Fibres	10.86	1.77	85.96%
Glass bottles – alcoholic	Fibres	5.34	0.26	95.35%
Total Fibres		100.33	23.83	80.81%
Spiral Wound Containers	Containers	0.39	0.22	63.34%
#1 PET containers, bottles and jars – non alcoholic	Containers	15.80	3.48	81.96%
#1 PET bottles – alcoholic	Containers	0.04	0.06	39.21%
#2 HDPE bottles and containers	Containers	4.01	1.04	79.44%
#2 HDPE bottles and containers- alcoholic	Containers	0.00	0.00	N/A
#5 PP- bottles and containers	Containers	3.53	2.15	62.11%
#5 PP- bottles and containers- alcoholic	Containers	0.00	0.01	N/A
#6 PS – expanded polystyrene and nonexpanded	Containers	0.79	1.09	42.06%
Aluminum UBC foil and trays – non-alcoholic	Containers	3.62	2.75	56.78%
Aluminum UBC – alcoholic	Containers	0.65	0.15	81.49%
Steel cans	Containers	4.05	1.10	78.65%
Steel- alcoholic	Containers	0.00	0.00	N/A
Total Containers		32.88	12.05	73.17%

Table 3.6 outlines the capture rates for the curbside green bin organic material. The materials with the highest capture rate is certified compostable liners (96.50%). The material with the lowest capture rate was Paper Food waste (5.60%), Untouched Dry Food Waste (12.63%) and followed by Paper Towelling (17.20%). Of all food waste, Unavoidable Food Waste had the highest capture rate (47.11%).

Table 3.6 Single Family Green Bin Capture Rates

Material Category	Accepted Stream	Diverted kg/hh/yr	Disposed kg/hh/yr	Capture Rate (%)
Unavoidable Food Waste	Organics	29.43	33.04	47.11%
Paper Food Waste	Organics	0.36	6.00	5.60%
Certified Compostable Bag Liners	Organics	1.25	0.05	96.50%
Tissue/Paper Toweling	Organics	4.22	20.30	17.20%
Leftover Fresh Foods	Organics	8.66	17.72	32.83%
Leftover Dry Foods	Organics	6.35	13.52	31.95%
Untouched Fresh Foods	Organics	4.51	12.38	26.70%
Untouched Dry Foods	Organics	0.78	5.38	12.63%
Total Green Bin		55.55	108.38	33.89%

3.8 Incidence of Food Waste in the Garbage Stream Across Rural and Urban Areas

Throughout the four seasons, households in rural areas consistently had more wasted food and unavoidable food waste in the garbage stream. Of the total 1230.91 food waste in the garbage stream, rural households represented approximately 60% of all wasted food and unavoidable food waste found while urban households represented the remaining 40%. Table 3.7 and Figures 3.22 – 3.23 display the incidence of food waste in the garbage stream in rural and urban areas.

Table 3.7 Incidence of Food Waste in the Garbage Stream Between Areas

Area	Wasted Food (kg/hh/yr)		Unavoidable Food Waste (kg/hh/yr)	
Rural	228.43	60%	159.05	62%
Urban	154.35	40%	98.24	38%
Total	382.78	100%	257.29	100%

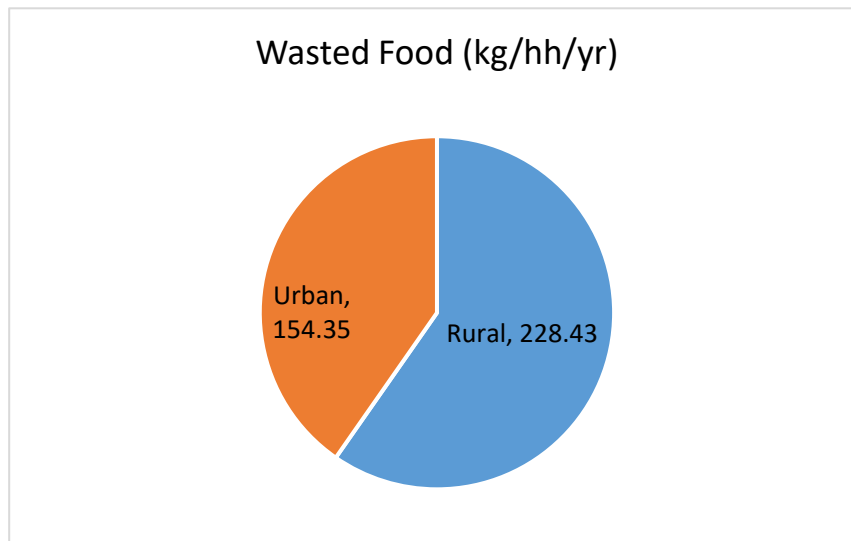


Figure 3.22 Annual Wasted Food in the Garbage Stream Between Areas

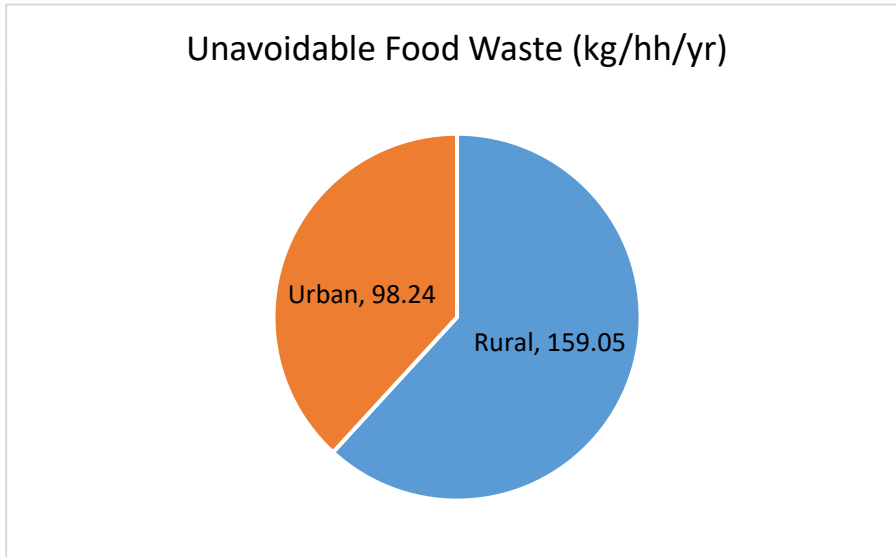


Figure 3.23 Annual Unavoidable Food Waste in the Garbage Stream Between Areas

3.8.1 Incidence of Food Waste in the Garbage Stream Across Sampled Streets

In the rural areas, Cottonwood Dr had the highest incidence of both wasted food and unavoidable food waste in the garbage stream with 150.36 kg and 97.60 kg annually, respectively. Blessington Rd had the second highest amount of wasted food in the garbage stream with 110.87 kg, and Chestnut Dr had the second highest amount of unavoidable food waste in the garbage stream with 76.90 kg annually.

Princeton Pl had the lowest amount of wasted food and unavoidable food waste in the garbage stream annually with 32.02 kg and 31.69 kg, respectively.

Table 3.8 displays the annual amount of wasted and unavoidable food waste in the rural areas.

Table 3.8 Food Waste in the Garbage Stream in Rural Areas

Rural	Wasted Food (kg)	Unavoidable Food Waste (kg)
Cottonwood Dr	150.36	97.60
Blessington Rd	110.87	76.90
Chestnut Dr	96.65	63.75
Point Anne Road	49.40	35.93
Princeton Pl	32.02	31.69

Figures 3.24 to 3.27 display instances of food waste and unavoidable food waste in the rural garbage stream over the 4 seasons.



Figure 3.24 Food Waste in the Rural Garbage Stream



Figure 3.25 Food Waste in the Rural Garbage Stream



Figure 3.26 Unavoidable Food Waste and Food Waste in the Rural Garbage Stream



Figure 3.27 Unavoidable Food Waste in the Garbage Stream

In the urban areas, Third St had the highest amount of wasted food in the garbage stream with 74.62 kg, followed by Charles Street with 68.96 kg over the 4 seasons. Heartwood Dr had the highest amount of unavoidable food waste in the garbage stream with 51.60 kg, followed by Purdy Street with 44.34 kg over the 4 seasons.

In contrast, Heartwood Dr had the least amount of wasted food in the garbage stream with 38.27 kg over the 4 seasons, and Third Street had the least amount of unavoidable food waste in the garbage stream with 21.01 kg over the 4 seasons.

Table 3.9 displays the amount of wasted food and unavoidable food waste in the urban areas over the 4-seasons.

Table 3.9 Food Waste in the Garbage Stream in Urban Areas

Urban	Wasted Food (kg)	Unavoidable Food Waste (kg)
Third Street	74.62	51.60
Charles Street	68.96	44.34
Purdy Street	59.28	40.97
Dewal Pl	55.69	31.01
Heartwood Drive	38.27	21.01

Figures 3.28 to 3.31 display instances of food waste and unavoidable food waste in the urban garbage stream.



Figure 3.28 Food Waste in the Urban Garbage Stream



Figure 3.29 Unavoidable Food Waste in the Urban Garbage Stream



Figure 3.30 Unavoidable Food Waste in the Urban Garbage Stream



Figure 3.31 Food Waste in the Garbage Stream

3.8.2 Implications of Findings

Considering that rural areas had the most amount of wasted food and unavoidable food waste in the garbage stream, this indicates a poor compliance with the green bin organics program in these areas. This could be due to a number of factors, including misinformation, lack of resources, or potential animal problems with organic food waste. Animals may be a large contributing factor as they may cause a disturbance to bins or be a perceived problem when residents set out their household waste.

Food waste, both wasted and unavoidable, is a significant portion of the garbage stream. Reducing this could significantly increase the diversion rate and capture rate for green bin organics. Section 4.0 outlines recommendations to reduce the amount of food waste in the garbage stream.

4.0 UPCOMING LEGISLATION

4.1 Extended Producer Responsibility

Beginning in 2026, [Extended Producer Responsibility](#) (EPR) will be fully introduced to Ontario cities. EPR entails that businesses responsible for supplying recyclable packaging are financially responsible for the end-of-life management of these materials. While this means that the City will not be financially responsible for the disposal of recyclable packaging, it is still vital to ensure that all divertible recyclables are being correctly diverted within the City's curbside diversion programs.

By ensuring that recyclables are being diverted out of landfill, this could lower the City's disposal costs and potentially lengthen the lifespan of the landfill. EPR will be fully implemented in Ontario cities beginning [January 1st, 2026](#). It is important that the City still actively works towards improving diversion and capture rates to ensure that all accepted divertible materials are being diverted away from the landfill.

Additionally, the City could work with residents to help in making informed decisions about packaging, such as providing resources on re-using rigid recyclable packaging, encouraging the use of purchasing sustainable products, and working towards introducing [refillery stores](#) to the City.

4.2 Food and Organic Waste Policy Statement

In accordance with the [Food and Organic Waste Policy Statement](#), the City fell under the target of a "50% waste reduction and resource recovery of food and organic waste generated by single family dwellings in urban settlement areas by 2025." In order to keep consistent with this 50% target, Sections 2 to 4 have relevant information that could help improve the City's diversion and organic capture rates. The City of Belleville currently diverts 33.88% of food and organic waste from landfills.

Section 2 (2.4) encourages municipalities to "engage in additional waste reduction and resource recovery efforts" and outlines organic waste that the City can consider including in their current green bin organic program in addition to already accepted categories including personal hygiene wastes and pet waste. By including these items into the green bin organics stream, it would assist in increasing the City's diversion rate by keeping these items out of the garbage stream.

Section 2 (2.5) outlines waste reduction and resource recovery activities that the City can undertake to meet the 50% target. These include preventing and reducing food and organic waste at the source, preventing excess food from becoming waste, and developing food and organic waste into "end-products for a beneficial use." The City utilizes finished compost for agricultural use according to their website and is able to meet that activity.

In respect to preventing and reducing food and organic waste and redirecting excess food, the Section 3 (3.3) includes resources to assist the City in achieving this activity. Section 3 (3.3) directs municipalities to "develop and implement their own promotion and education programs aimed at preventing food waste." This section dictates that these programs should have a primary focus on preventing and reducing food waste at the source.

The City can consider using social media to reach residents with resources on how to reduce food waste and use excess food scraps before diverting them through the green bin organics program. Companies such as [Too Good To Go](#) offer insights and activities residents can undertake to reduce the amount of food waste they produce. If residents can visualize the impact of reducing and diverting food waste, it may encourage stronger attitudes toward reduction and diversion.

Finally, in Section 4 (4.1) the policy statement dictates that municipalities that currently provide curbside green bin organic programs are expected to ensure that these programs are maintained and expanded where necessary to ensure all residents have access to the collection services. This can include ensuring residents are aware of the accepted materials in their green bin and know where to apply for new green bins or report issues and understand the importance of diverting food and organic waste.

5.0 RECCOMENDATIONS

Enhance Waste Diversion Programs

Improving waste diversion involves expanding the separation and collection of recyclable and compostable materials to align with best-case management practices. Programs can be enhanced by offering educational initiatives to promote proper waste segregation. Collaboration with local waste management providers can further increase efficiency and engagement. These efforts collectively minimize the volume of waste sent to landfills, reducing associated emissions.

Adopt Circular Economy Practices

Circular economy strategies focus on maximizing resource efficiency by promoting reuse and recovery. Initiatives such as donation programs for reusable items, material repurposing systems, and take-back programs for products can greatly reduce waste. Partnerships with recovery-focused industries can help reclaim valuable resources while minimizing landfill contributions. By integrating these practices into operations, it can assist in moving closer to a zero-waste model.

Regular Monitoring and Reporting

A robust monitoring and reporting system is critical for tracking the effectiveness of waste management efforts. Digital tools or software can be used to measure key metrics, such as diversion rates and landfill contributions. Frequent waste audits allow Cities to track changes in waste trends and monitor the effectiveness of initiatives. It is recommended that waste audits are conducted with as similar parameters as possible every few years. A sample size of 100 households over 4 seasons is the industry standard for ensuring adequate data.

5.1 Increasing Diversion and Capture Rates

Diversion and capture rates can be increased by encouraging residents to dispose of divertible materials in the City's current diversion program. This can be done through community education and engagement such as participation surveys and flyers sent to households about the impacts of diverting recyclable and compostable materials. These flyers could contain information about what is accepted in the City's current diversion programs along with current collection schedules. More information about this can be found in Section 4.2. Additionally, information about the impacts of diverting waste could be included such as disposal costs, the life expectancy of landfills, and how diverting waste can have a positive impact on the community and waste disposal.

Allowing residents to view the impacts diverting waste could have on the community such as lowering disposal costs and increasing the life expectancy of landfills can encourage them to better utilize the current diversion programs.

Cross Contamination in the Fibres and Containers Streams

While the fibres and containers stream had a low incidence of contamination (8.01% and 12.65% respectively), the containers stream had a higher cross contamination rate (35.85%) compared to the fibres stream (5.40%).

The largest cross contaminant in the containers stream was recyclable glass (22.71%) followed by recyclable film (4.31%), both of which are accepted in the fibres stream. This could be improved by education with residents on what is accepted in each recycling stream.

Switching to single stream recycling for single family residents might be helpful to reduce cross contamination but could increase overall contamination. The City should work closely with Circular Materials and residents to make changes to the Blue Box program.

Food Waste in the Garbage Stream

Food Waste comprises 27.96% of the garbage stream annually. Most of the food waste (both wasted food and unavoidable food waste) produced by residents was disposed of in the garbage stream with 1.56 kg/hh/wk instead of through the green bin organics program with 0.96 kg/hh/wk. Approximately 60% of all the food waste in the garbage stream was disposed of in rural areas with the remaining 40% disposed of in urban areas.

This is a valuable opportunity for the City to increase its green bin organics capture rate of 33.88%. This can be done with increased education and awareness. One opportunity could be to mail organics sorting guides in addition to the recycling sorting guides to residents. Another consideration would be to utilize social media to highlight the importance of diverting organic waste from the landfill. While the City currently has two videos highlighting the green bin organics program, these could be updated and posted on social media platforms to reach more residents.

These efforts should be targeted at residents in rural areas, considering these areas have the highest proportion of food waste in the garbage stream. A factor which could limit participation of the green bin organics program could be concern over animals or odour. Although there are resources on managing both these issues on the City's website, these could be updated and mailed out to residents. The City should consider outlining these in a manner which is easily accessible.

A review of the current Collection and Disposal of Waste By-Law (98-175) which includes consideration for an updated collection schedule to help increase capture rates. Municipalities throughout Ontario have seen success in moving to biweekly garbage collection (Ottawa, Guelph, Region of Waterloo, etc.). Benefits include reduction in hauler fees and encourage residents to use blue box and green bin streams, resulting in less waste to landfill.

5.2 Internal Resources for Waste Management

The City should prioritize evaluating its internal operations to ensure it has the necessary resources, including sufficient staffing, to effectively manage waste. This evaluation should assess current staffing levels, identify potential gaps, and ensure that the right expertise and capacity are in place. Additionally, the City should ensure that resources are allocated appropriately to maintain waste management operations in compliance with regulatory requirements and to meet its established targets. Adequate staffing is crucial not only for day-to-day operations but also for addressing future challenges and ensuring the City's waste management needs are met sustainably.

6.0 CONCLUSION

The City of Belleville contracted AET Group Inc. (AET) to conduct a residential curbside waste composition audit, which included a two-week sampling period of 100 single family households each season. The study included collecting and sorting garbage, recycling (2 stream, fibres and containers), and organics from ten single family sample areas, each comprising ten households. Curbside set-out and participation data was also collected. Summaries of the key results are as follows:

- **Single-Family Curbside Surveying Results:**
 - Garbage – an average of 0.62 items were set out per household per week, with a participation rate of 47.20% for the garbage stream.
 - Fibres – an average of 0.72 items were set out per household per week, with a participation rate of 56.06% for the fibres stream.
 - Containers – an average of 0.70 items were set out per household per week with a participation rate of 58.00% for the containers stream.
 - Green Bin (Organics) - an average of 0.24 green bins were set out per household per week, with a participation rate of 23.93%.
- **Single-Family Garbage Stream Composition:**
 - Total garbage material generated by a single-family household is 291.18 kg/hh/yr (5.60 kg/hh/wk).
 - Accepted green bin material was the largest disposed divertible component in the garbage stream at 35.64%, or 103.77 kg/hh/yr (2.00 kg/hh/wk). Compostable Paper was 0.44 kg/hh/wk or 7.82% of this material.
 - Of the accepted green bin material in the garbage stream, approximately 46.65% consisted of wasted food and 31.40% consisted of unavoidable food waste.
 - Recyclable containers comprised 4.09% of the garbage stream, at 12.00 kg/hh/yr (0.23 kg/hh/wk)
 - Recyclable Fibres (including recyclable film) comprised 8.07% of the garbage stream, at 23.63 kg/hh/yr (0.45 kg/hh/wk).
- **Single-Family Fibres Composition:**
 - Total average grey bin material generated by single-family household is 88.37 kg/hh/yr (1.70 kg/hh/wk).
 - Among the highest capture rates for fibres were glass bottles and jars (90.66%), corrugated cardboard and boxboard (86.93%), and mixed paper (81.16%)
 - The lowest capture rate was for Flexible Film Plastics (36.33%).
 - The fibres stream had a contamination rate of 8.03%.
- **Single-Family Containers Composition:**
 - The containers generated by a single-family household is 59.17kg/hh/yr (1.14 kg/hh/wk).
 - The highest capture rates were observed for #1 PET Bottles, Containers and Jars – non alcoholic (81.96%), Aluminum UBC – Alcoholic (81.49%), and Steel cans (78.65%).
 - The lowest capture rates for containers was observed to be #1 PET Bottles – alcoholic (39.21%)
 - The blue bin stream had a contamination rate of 12.63%.
- **Single-Family Green Bin (Organics) Composition:**
 - Total average green bin material generated by a single-family household is 60.08 kg/hh/yr (1.16 kg/hh/wk).
 - The highest capture rates include certified compostable liners (96.50%)
 - Of all food waste, unavoidable food waste had the highest capture rate (47.11%), and untouched dry food waste had the lowest (12.63%).

- The City of Belleville currently diverts 33.88% of food and organic waste from landfill, which is below the 50% waste reduction and resource recovery of food and organic waste generated by single-family homes.
- Of the accepted material found in the green bin, approximately 33.73% consisted of wasted food waste, and 48.91% of unavoidable food waste.
- The single-family curbside green bin organic stream had a contamination rate of 6.53%.

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Disclaimer

AET Group Inc. makes no warranty and assumes no liability for the information contained in this report outlining the waste audit study results. These results reflect measurements made over the 2 weeks in each season as described in the methodology. As such, waste generation measurements should be considered snapshots and may not reflect accurately conditions across the City of Belleville over time. These reported generation, capture, diversion, and contamination rates more accurately reflect the quantity of each material generated over the study period and have been extrapolated to calculate annual rates based on 365 days a year as outlined in the calculations.

APPENDIX A
WASTE AUDIT SORT RESULTS



